



INTERNATIONAL HEALTH

World's Children Threatened

The first global conference to focus on children's environmental health was held in Bangkok, Thailand, on 3–7 March 2002. The International Conference on Environmental Threats to the Health of Children, sponsored by the World Health Organization, focused on threats to children in the Asian and Pacific regions, but many of these threats are also of worldwide importance. The meeting of more than 300 participants culminated with the issuance of *The Bangkok Statement*, a pledge to promote the protection of children's environmental health. [See box and Web at <http://ehp.niehs.nih.gov/bangkok/>.]

Meeting attendees agreed that environmental threats to children's health can vary significantly from nation to nation. In developed countries, diseases transmitted by food, water, and animals are less important than chronic diseases linked to exposures to polluted air, pesticides, and heavy metals, but in many developing countries, particularly where poverty is endemic, children must contend with the double threat of both infectious diseases and industrial environmental insults. Press releases issued during the conference noted that three million children under the age of five are killed annually by diseases and injuries resulting from exposure to unsafe drinking water and inadequate sanitation, indoor air pollution, and accidents including poisonings. A major outcome of the meeting was the call for immediate removal of lead from gasoline in Asia, the major source of childhood exposure. New data from Thailand showed that blood lead levels in children are

falling as leaded gasoline is phased out.

Says Elaine Faustman, director of the Center for Child Environmental Health Risks Research at the University of Washington in Seattle, who attended the meeting, "I go to a lot of conferences where the science is everything, but the more important thing [in Bangkok] was the larger voice. The sharing and commonality on some of the issues that people face around the world is just striking."

Faustman found especially memorable a breakout session on hazardous waste, where presenters described the many dangers to children who scavenge through waste dumps



either as workers or simply searching for food. Such children are often exposed to leaking batteries and medical waste, among other toxicants. Other sessions focused on indoor and outdoor air quality issues such as biomass burning, ambient tobacco smoke, and leaded gasoline; and on developmental disorders and birth defects associated with exposure to persistent organic pollutants, lead, mercury, and endocrine disruptors.

The Bangkok Statement is an expression of intent rather than a concrete blueprint for action, but participants and organizers alike emphasized the utility of the increased

networking and exchange of ideas provided by the conference. Terri Damstra, an attendee from the WHO International Programme on Chemical Safety, hopes one outcome will be participation by developing countries in the U.S. National Children's Study, a longitudinal cohort of children from embryo to late adolescence being planned by U.S. federal agencies.

Irma Makalinao, an attendee from the Philippine National Poisons Control and Information Service, said that there is beginning to be cooperation between research groups such as the Asia Pacific Association of Medical Toxicology and regional advocacy groups on children's environmental health issues.

Although industry was not formally represented in Bangkok, the American Chemistry Council (ACC) notes that in 2001, 35 of its members joined the EPA's Voluntary Children's Chemical Evaluation Program—a pilot program to assess the potential effects of chemicals on children. Peggy Geimer, acting chair of the ACC's Medical Outreach Subteam, says that the group supports research "identifying vulnerable groups, including fetuses and children, and characterizing factors that may place those groups at higher risk."

Research and activism on children's environmental health have increased rapidly in recent years. "This is something that people were barely talking about five years ago, neither in the U.S. nor overseas," says Philip Landrigan, director of the Center for Children's Health and the Environment at Mt. Sinai Medical School in New York. In Bangkok, Landrigan says, "There was amazing unanimity of opinion that people from all the different nations were strongly in support of *The Bangkok Statement*." —Valerie Brown

Excerpt from *The Bangkok Statement*

We Recognize

That a growing number of diseases in children have been linked to environmental exposures. That environmental exposures are increasing in many countries; that new emerging risks are being identified; and that more and more children are being exposed to unsafe environments.

We Affirm

That the principle "children are not little adults" requires full recognition and a preventive approach. That all children should have the right to safe, clean and supportive environments that ensure their survival, growth, development, healthy life, and well-being.

We Commit Ourselves

To strengthen existing programmes and initiate new mechanisms to provide all children with access to clean water and air, adequate sanitation, safe food, and appropriate shelter;

To promote the recognition, assessment and study of environmental factors that have an impact on the health and development of children;

To promote the education of children and parents about the importance of their physical environment and their participation in decisions that affect their lives, and to inform parents, teachers and caregivers and the community in general on the need and means to provide a safe, healthy and supportive environment to all children;

To advocate and take action on the protection and promotion of children's environmental health at all levels, including political, administrative, and community levels

For all those concerned about the environmental health of children, the time to translate knowledge into action is now.

Bangkok, 7 March 2002

AIR POLLUTION

Bad Air and Birth Defects

Women exposed to levels of ozone and carbon monoxide that occur in large urban areas may have a higher chance of giving birth to babies with serious heart defects, according to researchers at the University of California, Los Angeles (UCLA). The study, published in the *American Journal of Epidemiology* in January, provides the first compelling evidence that air pollution may play a role in causing some birth defects, according to lead author UCLA epidemiologist Beate Ritz.

Three observations make the work compelling, she says. The heart defects correlate with exposure in the second month, when the heart and other organs form. In addition, there is a “clear dose–response relationship to



the data,” and no chromosomal defects were associated with the air pollution.

The research was carried out at the UCLA School of Public Health and the California Birth Defects Monitoring Program, in Oakland, California. Previous research by the same team has linked air pollution to harmful effects on pregnancy, including premature birth and low birth-weight babies. Recent studies conducted in China, the Czech Republic, Brazil, Mexico, and the United States have related ambient air pollution to such adverse birth outcomes as low birth weight, preterm birth, and fetal mortality.

Ritz’s team looked at air monitoring data for pollution that comes directly, or indirectly, from vehicles—carbon dioxide, nitrogen dioxide, ozone, and PM₁₀ (particulate matter less than 10 mm in diameter). The pollution monitoring data came from the South Coast

Air Quality Monitoring District, the air pollution control agency for southern California. By matching ZIP codes, the researchers compared this with information from the California Birth Defects Monitoring Program, a large, population-based registry on birth defects.

Using information on more than 9,000 babies born between 1987 and 1993 in the Los Angeles area, the team found that at increased levels of ozone and carbon monoxide, pregnant women faced an elevated risk of having a child with serious heart defects. These defects include holes in the heart, arterial defects, or pervasively malformed hearts. Normally this group of heart defects occurs 1.76 times per 1,000 births, with about 935 cases in California each year.

Ritz split exposure levels into quartiles and then compared each quartile with the lowest exposed group. “The clear dose–response for these effects is striking,” she said. For women living in areas with the highest pollution levels, the risk tripled in comparison with women living in clean air areas. At moderate pollution levels, the risk was doubled.

The lack of chromosomal defects also led Ritz to attribute the heart defects to air pollution. This is because chromosomal defects occur at conception and should not be influenced by environmental factors during pregnancy.

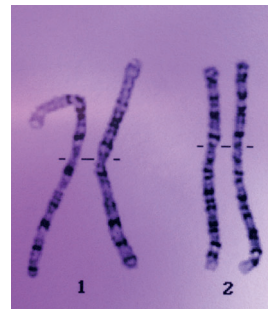
However, the link with ozone and carbon monoxide is not clear. “We’re not sure carbon monoxide is the culprit because it could be just a marker for something else in tailpipe exhaust,” said co-author Gary Shaw of the California Birth Defects Monitoring Program. “The fact that certain heart defects are turning up in the second month of pregnancy when hearts are being formed suggests something serious may be happening.”

Although the study is the first rigorous effort to demonstrate a link between air pollution and birth defects, the findings do have limitations, said Ritz. Researchers were only able to estimate mothers’ exposure to routinely measured air pollutants. They relied on air pollution concentrations collected at the air-quality monitoring station nearest a mother’s home—in some cases up to ten miles away. Also they were unable to evaluate other potential risk factors for birth defects, including maternal smoking, occupational exposures, vitamin supplement use, diet, and obesity.

Ritz and her colleagues are currently addressing these limitations by improving exposure estimates in a new study investigating the effects of confounding factors on preterm birth and birth weight for a group of 2,000 infants. —Rebecca Renner

U.K. Landfill Legacy

A study published in the 25 January 2002 issue of *The Lancet* by the European Commission’s Eurohazcon project found that women living within 3 km of a hazardous waste landfill have a 40% greater risk of conceiving a child with a chromosomal birth defect such as Down syndrome. The study has sparked controversy in the United Kingdom, where 8 of the 23 waste sites studied are located. The others are located in Denmark, Italy, Belgium, and France.



Reacting to the article’s release, U.K. environmental groups called on their government to reduce the landfilling of hazardous waste by increasing landfill tax rates and to set stricter regulatory targets for decreasing the flow of such waste to landfills. Waste industry officials countered that the study is irrelevant to modern regulated landfills.

Treated Wood Gets Axed

On 12 February 2002, the EPA announced that the pressure-treated wood industry has voluntarily agreed to phase out chromated copper arsenate (CCA) in wood for residential uses by 31 December 2003, anticipating an EPA ban set to take effect in January 2004. The ban would eliminate the sale of 85% of CCA-treated wood products. CCA is the compound most commonly used to protect wood from insects and rot. Arsenic, which causes lung, bladder, and skin cancer in humans, has been shown to leach out of treated wood used in structures such as decks and playground equipment.

Environmental and consumer groups are calling on the EPA to continue research to determine the health risks to consumers from wood already in use.

The Legalities of Lead

The nation’s largest lead disclosure agreement to date has been announced by the Denver, Colorado-based Apartment Investment and Management Company, one of the largest property management firms in the United States. The company will test 130,000 of its apartments in 47 states and the District of Columbia, and remove any lead paint found. Lead paint is considered one of the primary routes of lead poisoning of children in the United States. The company admitted that it had failed to warn some tenants that their home could contain potentially hazardous lead paint, an offense under the Residential Lead Based Paint Hazard Reduction Act of 1992. The company will also pay a fine of \$129,580.



INNOVATIVE TECHNOLOGIES

Reading, Writing, and Surfing

Day after day, your child comes home from school suffering from a headache, nausea, and a cough. After a few hours at home, he feels fine. If you suspect that indoor pollution at school is to blame, what signs do you look for? And if you find a problem at school, how can you fix it?

These and similar questions perplex parents, teachers, and school board members every day. To help provide some answers, the Canadian advocacy organizations Pollution Probe, the Technology and Health Foundation, and the Education Safety Association of Ontario have launched HealthySchools.com, an interactive Web site.

Common indoor pollutants such as mold, odors from perfumes and cleaning products, and volatile organic compounds that slowly evaporate from particle-board desks are common sources of health problems in schools. Bruce Small, executive director of the Technology and Health Foundation, says, "At least 15% of any population is chemically sensitive. That translates into many people in every school, whether students or staff." Children are at special risk from pollutants because, in proportion to their size, they

breathe more air than do adults. Indoor air pollution is compounded by ventilation systems that aren't maintained because of lack of budget or staff or both, Small says.

HealthySchools.com is intended to provide a variety of practical information for teachers, parents, and others who must tackle school environmental problems on their own. Canadian schools are under the jurisdiction of the provinces, and no federal money is specifically allocated for improving schools' indoor environmental quality. "School boards have to find creative ways of solving problems," says Sandra Schwartz, manager of Pollution Probe's child health program. "HealthySchools.com is designed so that users can develop their own how-to manuals."

The Web site is divided into seven different areas, including case studies of specific schools, links to existing references such as "Tools for Schools" from the U.S. EPA, discussion groups, and topic pages on broad subjects such as common indoor pollutants or emission characteristics of paints. Visitors looking for specific facts can search the entire site by key word.

By creating a Web site rather than a brochure or other hard-copy resource, the site's creators hoped to make information about indoor air quality widely accessible and easily updated. "Every school has at least one computer in it," Small says. The site is also intended as a place to consolidate information

about indoor air quality. "There's a lot of good information out there but we decided that we needed to make a focus for it," Small says. HealthySchools.com links to other sites that include related information, such as the U.S. EPA and the New York-based Healthy Schools Network, Inc.

HealthySchools.com is unique because it includes not only official guidelines but also unfiltered personal experiences. "The site includes information from federal governments all the way down to community-based stories," Schwartz says. "School boards need to hear what parents think, what children's experiences are. It's beneficial to learn about what didn't work as well as what did work."

With such knowledge, individuals can make dramatic improvements in school environments with little expense. "You can change for the better the atmosphere of the school overnight just by changing to low-odor cleaning products," Small says. For example, at one school, replacing an outdated ventilation system was cost-prohibitive, so a custodian took it upon himself to update the existing system at a much lower cost.

The creators of HealthySchools.com are still updating the site and are eager for visitors to submit case studies and personal experiences. Visitors may make suggestions for improvement by sending e-mail to info@healthyschools.com.—**Angela Spivey**

CHILDREN'S HEALTH

Poor Environment Creates Wealth of Problems

Diseases associated with environmental chemical pollution afflict American children at a cost of between \$48.8 and \$64.8 billion, a group of Mount Sinai School of Medicine researchers report in a paper to be published in the July issue of *EHP*.

The researchers looked at the impact of pollution on the incidence, prevalence, death rates, and economic costs associated with childhood lead poisoning, asthma, cancer, and developmental disabilities. Sickness within all four of these disease categories has been attributed to chemical pollutants in the environment, although asthma, cancer, and developmental disabilities are multifactorial problems also tied to important nonpollutant factors.

"Diseases of environmental origin are potentially preventable, if you can identify responsible toxicants and phase out exposure to them," says pediatrician Philip Landrigan, director of Mount Sinai's Center for Children's Health and the Environment and the paper's lead author. "Part of the problem is that real etiologic research trying to identify the environmental causes of diseases in children is in its infancy." Laying out the costs of diseases associated with childhood exposure to environmental pollutants, the paper argues for increased investment in basic etiologic studies, exposure tracking, and disease surveillance. Understanding toxicity also lags, the paper states: only 43% of chemicals produced in large volumes (more than 1 million pounds/year) have been tested for potential human toxicity, and only

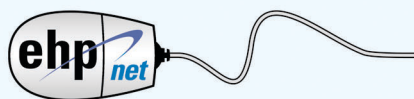
7% have been studied for impacts on development.

The group used an "environmentally attributable fraction" model to estimate the percentage of cases that can reasonably be assigned to environmental pollutants for each disease category, and then used these percentages to calculate direct and indirect costs of environmentally attributable disease from existing disease cost estimates. Their work focused only on potentially preventable exposures to chemicals of human origin in the air, food, water, soil, home, and community. It did not consider the additional effects of diet, social and economic status, or use of alcohol, tobacco, or abused drugs.

The study attributes 100% of childhood lead poisoning to environmental lead exposure and 10–35% of childhood asthma, 2–10% of children's cancer, and 5–20% of neurobehavioral disorders in children to the effects of environmental toxicants. Costs of the diseases include not only direct costs such as hospital stays and emergency department use, but also such other factors as economic loss from premature death, disability, diminished function, need for remedial education, and reduced lifetime earning potential of affected children.

Experience has shown, states the paper, that accurate information on costs of illness can help focus preventive efforts and can add perspective to work focused exclusively on the costs of pollution prevention. "What this kind of analysis does is inform the policy debate," Landrigan says. "It helps let policy makers know how important is one set of problems compared to other sets of problems."

These numbers will be helpful, says Gina Solomon, a senior scientist at the Natural Resources Defense Council. "Everything in this country is justified in terms of cost and disease burden," Solomon says. "Doing this kind of analysis may get the attention that we need, given the huge burden of disease."—**Victoria McGovern**



School Integrated Pest Management Web site

Only fairly recently has it become accepted that infants and children are at a higher risk from pesticides compared with adults exposed at comparable levels. The 1993 National Research Council report *Pesticides in the Diets of Infants and Children* stated that because of the rapid growth and development of their central nervous systems, children are especially vulnerable to exposure to neurotoxins. The report also highlighted the fact that children are exposed to pesticides not only through dietary intake but also from exposure to pesticide residues that linger after the chemicals have been applied in homes, schools, and parks.

One method of reducing the amount of pesticides used is integrated pest management (IPM)—a pest control process that focuses on long-term, environmentally sound steps for keeping unwanted pest populations in check.

In July 2000, California governor Gray Davis added a school IPM program as part of his Children's Health Initiative. That same year he signed into effect new state code requirements on pesticide notification, posting, and record keeping for schools, as well as enhanced pesticide use reporting. The state also created the School Integrated Pest Management Web site, located at <http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/main.cfm>, as a guide to school systems on how to adopt IPM to make the learning environment less toxic for employees and students.

Sources for easily accessible information on pesticide terminology, regulations, and toxicology, as well as links to technical information, such as the U.S. Department of Agriculture's *Glossary of Pesticide Chemicals* and Cornell University summaries of pesticide health effects on humans, are available through this Web site. The Health and Environment page of the site includes a list of links to documents and other sites on environmental impacts associated with pesticides, pesticide toxicology and regulation, and tips on reading and using the information on pesticide labels.

The Managing Pests page outlines the basic components of school IPM programs and provides more in-depth information via fact sheets, manuals, and color photo guides, as well as links to guides that assist in identifying pests, ranging from weeds to cockroaches. Here also are links to guidelines for schools to use in selecting and communicating with outside IPM contractors.

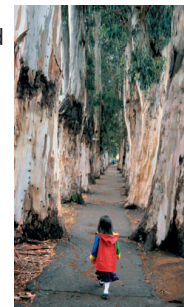
Samples of pesticide application warning signs, notices of pesticide application, and parent information sheets are among the items downloadable from the Tools and Templates page in either PDF or Microsoft Word format for use by school administrators. The Other Resources page provides links to a wide range of documents, including a link to a Purdue University survey on Parents, Public Schools, and IPM and links to school IPM manuals and workbooks from various state agencies and the U.S. Environmental Protection Agency.



A Babe in the Woods

A Cornell University study has found that children's attention spans are positively affected when they move to a home surrounded by more natural features such as woods and meadows. The study, led by Nancy Wells and published in *Environment and Behavior*, assessed the cognitive functioning of children who moved from poor- to better-quality housing that had more green spaces surrounding it. Those children who had the greatest change for the better in natural surroundings showed the greatest improvements in mental functioning.

Wells says that simple steps such as preserving existing trees, planting new trees, and maintaining grassy areas would be likely to have a marked positive impact on the welfare of children. She adds that the results suggest that the natural environment may play a larger role in children's well-being than previously recognized.



A Continuing Commitment to Kids

In fall 2001, President Bush extended the duration of the interagency Presidential Task Force on Children's Environmental Health and Safety for another 18 months. Its priorities will be to assess federal programs that focus on reducing the number of cases of child lead poisoning and on the increasing incidence of childhood asthma in the United States. After the group's first meeting, Housing and Urban Development (HUD) Secretary Mel Martinez announced \$59 million in grants to states and localities to fund the removal of lead hazards from approximately 7,000 privately owned homes in 16 states. HUD's Healthy Homes Program will receive \$8 million in additional grants to support programs that address health hazards related to the condition of housing.

Continental Cooperation

As part of the North American Commission for Environmental Cooperation (CEC), the top environmental agency administrators of Canada, Mexico, and the United States selected the nine members (three members per country) of the commission's children's health advisory board in October 2001. On 27 March 2002, the board issued its first advisory statement to the CEC Council on Children's Health and the Environment. In the statement, recommendations were made for actions to address asthma and respiratory disease, to reduce exposures to toxic chemicals such as lead and pesticides, and to develop resources for biomonitoring and health surveillance.



The Cost of Pediatric Environmental Disease

	Best Estimate	Low Estimate	High Estimate
Lead Poisoning	\$43.4	\$43.4	\$43.4
Asthma	\$2.0	\$0.7	\$2.3
Cancer	\$0.3	\$0.2	\$0.7
Neurobehavioral Disorders	\$9.2	\$4.6	\$18.4
TOTAL	\$54.9	\$48.8	\$64.8

Source: Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwarz J. Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities. *Environ. Health Perspect.* 110:723-730 (2002).